Create Data Frame with Relative Weight and Gabelhouse Length Categories

Alex J. Benecke

December 19, 2017

Here I need to make two data files. Both need to cantain fish caught in the years 2012-2016 (even though I will only be using years 2014-2016). Both will contain the Relative Weight (Wr) of each fish and the gabel house length category each fish fits into. Then I will create two CLEAN data files one of wich will contain only fish larger than stock length and another with all fish of any length.

The data file with fish of all lengths will be used to compare the length frequency distribution between years. The data frame with only gish stock length and larger will be used to compare the proportional size densities between years and with the relative weight between years.

```
Cond <- read.csv("./Data/Raw-Data/2012-2016_nearshore-survey_largemouth-bass.csv") %>%
  mutate(logW=log10(Weight),logL=log10(Length))
Cond$fyr <- factor(Cond$Year)

str(Cond)
```

```
## 'data.frame':    496 obs. of  13 variables:
##  $ Year  : int  2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 ...
##  $ Site  : int  18 18 18 18 18 18 18 18 18 18 ...
##  $ FID   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ Weight: num  8 10 10 30 25 20 40 155 145 170 ...
##  $ Length: int  72 82 85 108 110 115 119 220 220 230 ...
##  $ AC    : int  2 2 2 2 2 2 2 2 3 3 ...
##  $ AGE   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ SexCon: int  NA NA NA NA NA NA NA NA NA NA ...
##  $ Sex   : int  NA NA NA NA NA NA NA NA NA NA ...
##  $ Delts : logi  NA NA NA NA NA NA ...
##  $ logW  : num  0.903 1 1 1.477 1.398 ...
##  $ logL  : num  1.86 1.91 1.93 2.03 2.04 ...
##  $ fyr   : Factor w/ 5 levels "2012","2013",..: 1 1 1 1 1 1 1 1 1 1 ...
```

```
headtail(Cond)
```

```
##     Year Site FID Weight Length AC AGE SexCon Sex Delts     logW     logL
## 1   2012   18  NA      8     72  2  NA     NA  NA    NA 0.903090 1.857332
## 2   2012   18  NA     10     82  2  NA     NA  NA    NA 1.000000 1.913814
## 3   2012   18  NA     10     85  2  NA     NA  NA    NA 1.000000 1.929419
## 494 2016   18  11   1131    409  3   4      8   2    NA 3.053463 2.611723
## 495 2016   18  10   1258    423  3   8      8   2    NA 3.099681 2.626340
## 496 2016   18  24   1312    431  3   6      8   2    NA 3.117934 2.634477
##      fyr
## 1   2012
## 2   2012
## 3   2012
## 494 2016
## 495 2016
## 496 2016
```

```
unique(Cond$Year)
```

```
## [1] 2012 2013 2014 2015 2016
```

Year	Number of Fish	Number of Sites
2013	114	8
2014	143	11
2015	80	9
2016	132	11
Total	469	18

12 nearshore sites were sampled annually 2013 - 2016, 10 sites are sampled every year in addition to 2 sites which are sampled every five years. Length and weight data used in our analysis were obtained from 114 largemouth bass caught during 2013, 143 during 2014, 80 during 2015, and 132 during 2016. During 2013 - 2016 a total of 469 largemouth bass were obtained from 18 sites.

```
(wsLMB <- wsVal("Largemouth Bass", simplify = TRUE))
```

```
##            species min.TL    int slope
## 76 Largemouth Bass    150 -5.528 3.273
```

```
(wsLMB_min <- wsLMB[["min.TL"]])
```

```
## [1] 150
```

```
(wsLMB_int <- wsLMB[["int"]])
```

```
## [1] -5.528
```

```
(wsLMB_slp <- wsLMB[["slope"]])
```

```
## [1] 3.273
```

```
Cond %<>% mutate(Ws = 10^(wsLMB_int+wsLMB_slp*logL),
                 Wr=(Weight/Ws)*100)
headtail(Cond[,c(1,3,14,15)])
```

```
##     Year FID          Ws       Wr
## 1   2012  NA    3.556717 224.9266
## 2   2012  NA    5.443933 183.6907
## 3   2012  NA    6.123337 163.3097
## 494 2016  11 1047.539449 107.9673
## 495 2016  10 1169.531766 107.5644
## 496 2016  24 1243.495177 105.5091
```

```
headtail(Cond[Cond$Year==2013,]) ### No Wr for 2013
```

```
##     Year Site FID Weight Length AC AGE SexCon Sex Delts logW     logL  fyr
## 29  2013    8  55     NA    146 NA   1      6   2    NA   NA 2.164353 2013
## 30  2013    2  77     NA    154 NA   1      1   1    NA   NA 2.187521 2013
## 31  2013    2  78     NA    159 NA   1      6   2    NA   NA 2.201397 2013
## 140 2013   15 180     NA    411 NA   5      8   2    NA   NA 2.613842 2013
## 141 2013   18 139     NA    422 NA   3      8   2    NA   NA 2.625312 2013
## 142 2013   11   8     NA    426 NA   3      3   1    NA   NA 2.629410 2013
##             Ws Wr
## 29    35.96888 NA
## 30    42.83071 NA
```

```
## 31    47.55244 NA
## 140 1064.39857 NA
## 141 1160.50670 NA
## 142 1196.89931 NA
```

Creating data file with all size fish

```
### creating size breaks for Gabelhouse Length categories for Largemouth Bass
(lmb.cuts2 <- psdVal("Largemouth Bass"))
```

```
##  substock     stock   quality preferred memorable    trophy
##         0       200       300       380       510       630
```

```
### adding gcat variable to data frame
lmb <- Cond %>%
  mutate(gcat=lencat(Length, breaks = lmb.cuts2,
                     use.names = TRUE, drop.levels = TRUE))  ### create Gabelhouse Length Categories


headtail(lmb[,c(1,3,5,14:16)])
```

```
##     Year FID Length          Ws       Wr      gcat
## 1   2012  NA     72    3.556717 224.9266  substock
## 2   2012  NA     82    5.443933 183.6907  substock
## 3   2012  NA     85    6.123337 163.3097  substock
## 494 2016  11    409 1047.539449 107.9673 preferred
## 495 2016  10    423 1169.531766 107.5644 preferred
## 496 2016  24    431 1243.495177 105.5091 preferred
```

```
lmb[c(275:335),c(1,3,5,14:16)]
```

```
##     Year FID Length           Ws        Wr      gcat
## 275 2014  NA    405 1014.3790964 106.27191 preferred
## 276 2014  NA    405 1014.3790964 111.89111 preferred
## 277 2014  NA    407 1030.8666775 115.53385 preferred
## 278 2014  NA    413 1081.4452043 102.27055 preferred
## 279 2014  NA    414 1090.0392004  88.52893 preferred
## 280 2014  NA    415 1098.6805103 103.30574 preferred
## 281 2014  NA    421 1151.5301136 100.99606 preferred
## 282 2014  NA    435 1281.6674003  92.92582 preferred
## 283 2014  NA    468 1628.2259689  83.64932 preferred
## 284 2014  NA    479 1756.8639661  87.20083 preferred
## 285 2014  NA    483 1805.3398098  98.98414 preferred
## 286 2015  NA     27    0.1435006 696.86139  substock
## 287 2015  NA     46    0.8207415 121.84105  substock
## 288 2015  NA    126   22.2081711 255.31143  substock
## 289 2015  NA    128   23.3828924 242.48497  substock
## 290 2015  NA    146   35.9688785 157.63627  substock
## 291 2015  NA    147   36.7815170 308.30702  substock
## 292 2015  NA    147   36.7815170 154.15351  substock
## 293 2015  NA    158   46.5805536 243.44923  substock
## 294 2015  NA    162   50.5525006 112.16062  substock
## 295 2015  NA    170   59.1914964 191.58157  substock
## 296 2015  NA    182   73.9969216 153.24962  substock
## 297 2015  NA    185   78.0644074 145.26467  substock
```

```
## 298 2015  NA    196   94.3092132 120.24276  substock
## 299 2015  NA    202  104.0914437 108.94267     stock
## 300 2015  NA    213  123.8187576 137.37822     stock
## 301 2015  NA    216  129.6185407 131.23123     stock
## 302 2015  NA    232  163.7729510 103.86331     stock
## 303 2015  NA    234  168.4393285 134.64789     stock
## 304 2015  NA    253  217.4770663 130.35857     stock
## 305 2015  NA    256  226.0317287 125.42487     stock
## 306 2015  NA    275  285.7168852 119.06892     stock
## 307 2015  NA    276  289.1315108 117.66272     stock
## 308 2015  NA    277  292.5743738 116.27813     stock
## 309 2015  NA    280  303.0736900 149.66657     stock
## 310 2015  NA    288  332.3468849 136.48390     stock
## 311 2015  NA    291  343.8125718 115.44080     stock
## 312 2015  NA    298  371.6292016 122.05715     stock
## 313 2015  NA    304  396.6845072 128.64127   quality
## 314 2015  NA    305  400.9713790 113.12528   quality
## 315 2015  NA    307  409.6414577 124.57235   quality
## 316 2015  NA    311  427.3707090 119.40453   quality
## 317 2015  NA    313  436.4320306 103.93371   quality
## 318 2015  NA    315  445.6259187  89.06574   quality
## 319 2015  NA    316  450.2729124 125.92363   quality
## 320 2015  NA    317  454.9534526 124.62813   quality
## 321 2015  NA    320  469.1977049 120.84458   quality
## 322 2015  NA    320  469.1977049 120.84458   quality
## 323 2015  NA    320  469.1977049  96.67566   quality
## 324 2015  NA    321  474.0137842  95.69342   quality
## 325 2015  NA    322  478.8640873 118.40520   quality
## 326 2015  NA    326  498.6102533 125.08768   quality
## 327 2015  NA    328  508.6922141  89.16983   quality
## 328 2015  NA    329  513.7858910 110.35725   quality
## 329 2015  NA    330  518.9148810 131.11977   quality
## 330 2015  NA    330  518.9148810 109.26648   quality
## 331 2015  NA    331  524.0793209 108.18973   quality
## 332 2015  NA    331  524.0793209 129.82768   quality
## 333 2015  NA    335  545.0943160 104.01870   quality
## 334 2015  NA    340  572.1771306 104.04995   quality
## 335 2015  NA    343  588.8675935 115.54380   quality
```

```
#write.csv(lmb,file="Data/Clean-Data/2012-2016_nearshore-survey-largemouth-bass_CLEAN.csv")
```

Creating Data File with Only Stock and Larger Fish

```
### adding gcat variable to data frame
Stock <- Cond %>%
  filter(Length>=lmb.cuts2["stock"]) %>%
  mutate(gcat=lencat(Length, breaks = lmb.cuts2,
                     use.names = TRUE, drop.levels = TRUE))   ### create Gabelhouse Length Categories


headtail(Stock[,c(1,3,5,14:16)])
```

```
##     Year FID Length        Ws       Wr      gcat
```

```
## 1   2012  NA    220  137.6415 112.6114     stock
## 2   2012  NA    220  137.6415 105.3461     stock
## 3   2012  NA    230  159.1971 106.7859     stock
## 431 2016  11    409 1047.5394 107.9673 preferred
## 432 2016  10    423 1169.5318 107.5644 preferred
## 433 2016  24    431 1243.4952 105.5091 preferred
```

```
Stock[c(275:335),c(1,3,5,14:16)]
```

```
##     Year FID Length        Ws        Wr      gcat
## 275 2015  NA    305  400.9714 113.12528   quality
## 276 2015  NA    307  409.6415 124.57235   quality
## 277 2015  NA    311  427.3707 119.40453   quality
## 278 2015  NA    313  436.4320 103.93371   quality
## 279 2015  NA    315  445.6259  89.06574   quality
## 280 2015  NA    316  450.2729 125.92363   quality
## 281 2015  NA    317  454.9535 124.62813   quality
## 282 2015  NA    320  469.1977 120.84458   quality
## 283 2015  NA    320  469.1977 120.84458   quality
## 284 2015  NA    320  469.1977  96.67566   quality
## 285 2015  NA    321  474.0138  95.69342   quality
## 286 2015  NA    322  478.8641 118.40520   quality
## 287 2015  NA    326  498.6103 125.08768   quality
## 288 2015  NA    328  508.6922  89.16983   quality
## 289 2015  NA    329  513.7859 110.35725   quality
## 290 2015  NA    330  518.9149 131.11977   quality
## 291 2015  NA    330  518.9149 109.26648   quality
## 292 2015  NA    331  524.0793 108.18973   quality
## 293 2015  NA    331  524.0793 129.82768   quality
## 294 2015  NA    335  545.0943 104.01870   quality
## 295 2015  NA    340  572.1771 104.04995   quality
## 296 2015  NA    343  588.8676 115.54380   quality
## 297 2015  NA    343  588.8676 105.91515   quality
## 298 2015  NA    343  588.8676  96.28650   quality
## 299 2015  NA    349  623.2577 109.16833   quality
## 300 2015  NA    350  629.1218 108.15077   quality
## 301 2015  NA    351  635.0241 116.07434   quality
## 302 2015  NA    351  635.0241 107.14554   quality
## 303 2015  NA    363  708.8827  95.98203   quality
## 304 2015  NA    364  715.2944 103.04848   quality
## 305 2015  NA    364  715.2944  95.12167   quality
## 306 2015  NA    367  734.7710 100.31696   quality
## 307 2015  NA    370  754.6129 127.73436   quality
## 308 2015  NA    370  754.6129 105.19300   quality
## 309 2015  NA    371  761.3087  89.37242   quality
## 310 2015  NA    373  774.8239 102.44909   quality
## 311 2015  NA    378  809.3394  84.06857   quality
## 312 2015  NA    384  852.1501 119.76763 preferred
## 313 2015  NA    385  859.4349 105.55774 preferred
## 314 2015  NA    390  896.5086  82.21895 preferred
## 315 2015  NA    393  919.2779 111.02192 preferred
## 316 2015  NA    394  926.9560 103.98551 preferred
## 317 2015  NA    395  934.6786  84.92759 preferred
## 318 2015  NA    396  942.4457  84.22766 preferred
## 319 2015  NA    405 1014.3791  89.43402 preferred
```

```
## 320 2015  NA    407 1030.8667 110.00453 preferred
## 321 2015  NA    410 1055.9456  96.65270 preferred
## 322 2015  NA    412 1072.8984 105.69501 preferred
## 323 2015  NA    421 1151.5301 103.40155 preferred
## 324 2015  NA    427 1206.1198  94.02051 preferred
## 325 2015  NA    450 1432.0710  87.10462 preferred
## 326 2015  NA    465 1594.3127  78.24061 preferred
## 327 2016 124    202  104.0914 130.65435     stock
## 328 2016  35    207  112.7641 113.51128     stock
## 329 2016  16    214  125.7316 136.00405     stock
## 330 2016  29    217  131.5930 126.14655     stock
## 331 2016  71    219  135.6043 126.83960     stock
## 332 2016 104    220  137.6415 127.14188     stock
## 333 2016  70    222  141.7794 120.60986     stock
## 334 2016  39    223  143.8805 131.35905     stock
## 335 2016  15    228  154.7108 124.74885     stock
```

```
#write.csv(Stock,file="Data/Clean-Data/2012-2016_nearshore-survey-largemouth-bass_Stock_CLEAN.csv")
```

Creating a Data File to Summarize Relative Weight by Year for Stock Length Individuals

```
Stock %<>% filterD(!is.na(Wr))

Summarize(Wr~fyr, data=Stock, digits = 0) ### Wr Weight by Year
```

```
##    fyr   n mean sd min  Q1 median  Q3 max
## 1 2012  21  108  8  93 104    106 113 124
## 2 2014 140  110 16  80  99    107 118 151
## 3 2015  67  110 16  78  98    109 121 150
## 4 2016 107  115 14  62 108    115 125 146
```

```
(Wr.fyr.gcat_Stock <- Summarize(Wr~fyr*gcat, data=Stock) %>%
    arrange(fyr,gcat))
```

```
##     fyr      gcat  n      mean        sd    min     Q1 median    Q3   max
## 1  2012 preferred 10 104.33279  9.184145  93.08  97.87 104.40 107.0 124.5
## 2  2012   quality  8 111.48824  7.107669 101.20 105.70 112.30 115.7 121.5
## 3  2012     stock  3 108.24778  3.846934 105.30 106.10 106.80 109.7 112.6
## 4  2014 preferred 18  97.67045  8.942296  83.65  90.40  98.58 103.0 115.5
## 5  2014   quality 57 103.51170 11.643284  80.40  96.07 102.20 111.6 133.1
## 6  2014     stock 65 118.27433 15.782376  88.74 106.70 116.10 127.5 151.3
## 7  2015 preferred 15  97.08404 12.438525  78.24  86.02  96.65 105.6 119.8
## 8  2015   quality 38 109.32674 12.928592  84.07 100.80 108.20 120.5 131.1
## 9  2015     stock 14 124.89321 12.477382 103.90 116.60 123.70 133.8 149.7
## 10 2016 preferred 11 107.37315  6.899718  94.36 103.90 107.60 111.6 118.9
## 11 2016   quality 44 111.22398 14.357351  61.76 105.50 110.50 118.9 146.2
## 12 2016     stock 52 120.60206 12.540774  68.71 113.90 121.60 127.1 144.9
```

```
str(Wr.fyr.gcat_Stock)
```

```
## 'data.frame':    12 obs. of  10 variables:
##  $ fyr   : Factor w/ 4 levels "2012","2014",..: 1 1 1 2 2 2 3 3 3 4 ...
##  $ gcat  : Factor w/ 3 levels "preferred","quality",..: 1 2 3 1 2 3 1 2 3 1 ...
##  $ n     : num  10 8 3 18 57 65 15 38 14 11 ...
##  $ mean  : num  104.3 111.5 108.2 97.7 103.5 ...
```

```
##  $ sd    : num  9.18 7.11 3.85 8.94 11.64 ...
##  $ min   : num  93.1 101.2 105.3 83.7 80.4 ...
##  $ Q1    : num  97.9 105.7 106.1 90.4 96.1 ...
##  $ median: num  104.4 112.3 106.8 98.6 102.2 ...
##  $ Q3    : num  107 116 110 103 112 ...
##  $ max   : num  124 122 113 116 133 ...
```

```
#1-4-18#write.csv(Wr.fyr.gcat_Stock,file = "Data/Raw-Data/relative-weight_largemouth-bass_STOCK_RAW.csv
```

I have created a file with the relative weight of each gabelhouse length category for each year. The file name is relative-weight_largemouth-bass_RAW.csv.

Note

The relative weight data contains only stock length individuals. This is so that I can easily compare the relative weight of fish with PSD. This is done despite the min TL being 150 mm. I may want to summarize relative weight for 150mm and greater length individuals in the future to see if young/small fish drive down or increase Wr.

Creating a Data File to Summarize Relative Weight by Year Length >= 150mm

```
lmb.Wr <- lmb %>%
  filter(Length >= wsLMB_min) %>%
  filterD(Year>=2014)

(lmb.Wr.gcat <- Summarize(Wr~fyr*gcat,data = lmb.Wr,digits = 0) %>%
    arrange(fyr,gcat))
```

```
##     fyr      gcat  n mean sd min  Q1 median  Q3 max
## 1  2014 preferred 18   98  9  84  90     99 103 116
## 2  2014   quality 57  104 12  80  96    102 112 133
## 3  2014     stock 65  118 16  89 107    116 128 151
## 4  2014  substock  3  141 18 128 131    133 147 162
## 5  2015 preferred 15   97 12  78  86     97 106 120
## 6  2015   quality 38  109 13  84 101    108 120 131
## 7  2015     stock 14  125 12 104 117    124 134 150
## 8  2015  substock  6  161 49 112 126    149 182 243
## 9  2016 preferred 11  107  7  94 104    108 112 119
## 10 2016   quality 44  111 14  62 106    110 119 146
## 11 2016     stock 52  121 13  69 114    122 127 145
## 12 2016  substock 16  128  7 117 123    127 133 145
```

```
#1-4-18#write.csv(lmb.Wr.gcat,file = "Data/Clean-Data/relative-weight_largemouth-bass_150.csv")
```